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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,378	08/28/2001	Nobuki Matsui	0819-0627	3810
7590	02/12/2004			
Nixon Peabody 8180 Greensboro Drive Suite 800 McLean, VA 22102			EXAMINER MCHENRY, KEVIN L	
			ART UNIT	PAPER NUMBER
			1725	
DATE MAILED: 02/12/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/914,378

Applicant(s)

MATSUI ET AL.

Examiner

Kevin L McHenry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1/3 & 1/22.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

***Specification***

1. The abstract of the disclosure is objected to because it is too long. Correction is required. See MPEP § 608.01(b).

***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 1, in lines 3-4, uses the language "...by reaction including partial oxidation of feed gas containing hydrocarbon gas,...". This language is indefinite because it is unclear if the claim is citing a further range of the feed gas or if it is stating that the feed gas contains hydrocarbon gas. It is also unclear if the language is further limiting reactions to partial oxidation reactions or not. For examination purposes the examiner interpreted this language to mean "...by partial oxidation of feed gas that is composed of hydrocarbon gas,...".
5. In claim 1, line 5, the language "...undergoing no external heat..." is used. This language is indefinite because it is unclear what external heat is and how something does not "undergo" external heat. For examination purposes the examiner interpreted claim 1 to not include this language.

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6. Claim 10 recites the limitation "the distance" in line 2 of claim 10. There is insufficient antecedent basis for this limitation in the claim. This language is also indefinite because it is unclear what the distance spans; it is unclear what length the distance is measuring and what points it lies between. For examination purposes the examiner interpreted claim 10 to read "...characterized in that a distance between the shift reaction section (10) and a feed gas passage (3) at a downstream end of the shift reaction section (10), in relation to a flow direction of the reformed gas in the feed gas passage (3), is larger than a distance between the shift reaction section (10) and the feed gas passage (3) and an upstream end of the shift reaction section (10)."

7. Claim 12 recites the limitation "the pitch" in line 5 of claim 12. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a pitch".

8. Claim 12 recites the limitation "the direction" in line 6 of claim 12. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a direction".

### ***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Collins et al. (U.S.P. 5,458,857).

Collins et al. teach a shift conversion unit that has a reformer and a shift reaction section for processing hydrocarbon gas. Collins et al. teach that the unit is arranged to perform a shift reaction and introducing a reformed gas into a reformed gas passage so that the reformed gas exchanges heat with feed gas (see U.S.P. 5,458,857; particularly column 5, lines 28-30, 41-46; column 6, lines 15-32, 62-66; column 7, lines 1-46)

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al. (U.S.P. 5,458,857) as applied to claim 1 above, and further in view of Child et al. (U.S.P. 5,071,627).

Collins et al. teach the shift conversion unit taught above in section 10. However, Collins et al. do not teach the use of heat transfer fins.

Child et al. teach a reactor unit in which heat transfer fins extend from reactor unit areas into feed passages. Child et al. teach that this allows greater kinetic efficiency and heat transfer area (see U.S.P. 5,071,627; particularly Figure 1A; column 2, lines 63-68; column 3, lines 1-33, 62-68; column 4, lines 1-17, 54-64; column 5, lines 3-7).

It would have been obvious at the time that the applicant's invention was made to have modified the unit of Collins et al. by the teachings of Child et al. One would have been motivated to do so in order to allow greater kinetic efficiency and heat transfer area, as taught by Child et al.

13. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/08771.

WO 98/08771 teaches a shift conversion unit that has a reformer and a shift reaction section for processing hydrocarbon gas. The shift conversion catalyst can be a noble metal such as Pt. WO 98/08771 teaches that reformed gas is introduced into an annular passage leading to the shift conversion section so that it passes by the feed gas passage (see WO 98/08771; particularly Figure 1; page 9, lines 1-15; page 10, lines 13-29; page 11, lines 15-30).

WO 98/08771 does not specifically teach that the reformed gas and feed gas exchange heat. However, it would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made that because of the proximity and contact between the reformed gas and the feed gas passage (see tube 50 in Figure 1 and the arrows depicting flow of reformed gas pass tube 50) that heat exchange would occur between the reformed gas and the feed gas.

14. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/08771 as applied to claims 1-3 above, and further in view of Child et al. (U.S.P. 5,071,627).

WO 98/08771 teaches the shift conversion unit taught above in section 13.

However, WO 98/08771 does not teach the use of heat transfer fins.

Child et al. teach a reactor unit in which heat transfer fins extend from reactor unit areas into feed passages. Child et al. teach that this allows greater kinetic efficiency and heat transfer area (see U.S.P. 5,071,627; particularly Figure 1A; column 2, lines 63-68; column 3, lines 1-33, 62-68; column 4, lines 1-17, 54-64; column 5, lines 3-7).

It would have been obvious at the time that the applicant's invention was made to have modified the unit of WO 98/08771 by the teachings of Child et al. One would have been motivated to do so in order to allow greater kinetic efficiency and heat transfer area, as taught by Child et al.

15. Claims 1-3, 8, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lywood et al. (U.S.P. 5,030,440).

Lywood et al. teach a shift conversion unit that has a reformer and a shift reaction section for processing hydrocarbon gas. The shift conversion catalyst can be a noble metal such as Pt. Lywood et al. teach that reformed gas is introduced into an annular passage leading to the shift conversion section so that it passes by the feed gas passage. Heat is exchanged between the reformed gas in the reformed gas passage of the shift conversion section and the feed gas (see U.S.P. 5,030,440; particularly column 5, lines 66-68; column 6, lines 1-23; column 3, lines 56-60).

Lywood et al. do not teach the use of heat transfer fins.

Child et al. teach a reactor unit in which heat transfer fins extend from reactor unit areas into feed passages. Child et al. teach that this allows greater kinetic efficiency

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and heat transfer area (see U.S.P. 5,071,627; particularly Figure 1A; column 2, lines 63-68; column 3, lines 1-33, 62-68; column 4, lines 1-17, 54-64; column 5, lines 3-7).

It would have been obvious at the time that the applicant's invention was made to have modified the unit of Lywood et al. by the teachings of Child et al. One would have been motivated to do so in order to allow greater kinetic efficiency and heat transfer area, as taught by Child et al.

### ***Allowable Subject Matter***

16. Claims 9, 10, 12, and 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter: the instant application is deemed to be directed to nonobvious improvements over the invention of Lywood et al. (U.S.P. 5,030,440). The improvements comprise a reformed gas passage shape that causes reformed gas to flow from a center side toward an outer peripheral side of a shift reaction section, increasing the pitch of the heat transfer pins towards a downstream end along a direction of flow of reformed gas, and applying or supporting shift conversion catalyst in the shift reaction section on heat transfer fins.

### ***Conclusion***

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Andrew et al. (U.S.P. 4,810,472), Runl et al. (U.S.P. 6,096,106),

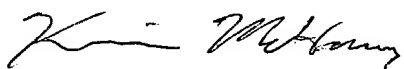
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Towler et al. (U.S.P. 6,409,974), and Voecks (U.S.P. 4,909,808) are cited of interest for illustrating the state of the art in hydrocarbon reactor design.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kevin McHenry

Kiley Stoner AU 1725  
*Kiley Stoner* 2/9/09